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AST-2660P-402-88

11 March 1988

Lasers (Non-Weapon) and Electro-Optics (U)**East German Fiber-Optic Transmission System (U)**

(C-WNINTEL) The East German company Kombinat Nachrichtentechnik exhibited the PCM-480 LLNS fiber-optic transmission system (see illustration) at trade fairs during 1986 and 1987; however, actual operation of this system has not been confirmed. The system, intended for use in urban and long-distance networks, consists of a multiplex unit, optical interface, fault-isolation unit, and rack.

(U) The multiplex unit has a multiplexer and a demultiplexer. The multiplexer interleaves four 120-channel 8.448-Mb/s data streams into a 480-channel 34.368-Mb/s data stream, and the demultiplexer performs the reverse operation. The multiplex unit conforms to International Telephone and Telegraph Consultative Committee (CCITT) recommendations for mastergroup multiplexers and can be used with conventional copper-cable transmission systems as well as optical fibers.

(U) The optical interface for the PCM-480 LLNS is designated DUS-LL-34. It consists of a light source, a photodetector, and a coder section. A separate fiber is used for each transmission direction. The light source is a gallium-aluminum arsenide (GaAlAs) laser diode operating at a wavelength of 0.840 μm and coupling -2 dBm of power into the fiber core. An avalanche photodiode (APD) is used as the detector. The APD is highly sensitive, producing one error in 10^{-9} bits when the received power is as low as -50 dBm. The 48-dB system margin (50-2) allows longer repeater spacing. The repeater spacing for the system is approximately 10 km, allowing 4-dB/km fiber loss and 8 dB for fiber splices and margin. The line coding section consists of a block encoder with five input bits and six output bits and a clock recovery unit. The block encoder provides redundancy for monitoring errors, and the clock recovery unit breaks up long strings of redundant data to ensure recovery of timing information.

(U) The system has a portable fault-isolation unit that can address up to 11 regenerator sections, causing the stream from the regenerator to be looped back to the transmitter. The fault-detection unit measures the error occurrence in the return stream by counting code violations. In this way, faults can be localized to one repeater span. The fact that the fault-isolation unit can address only 11 repeaters limits the system range to 120 km.

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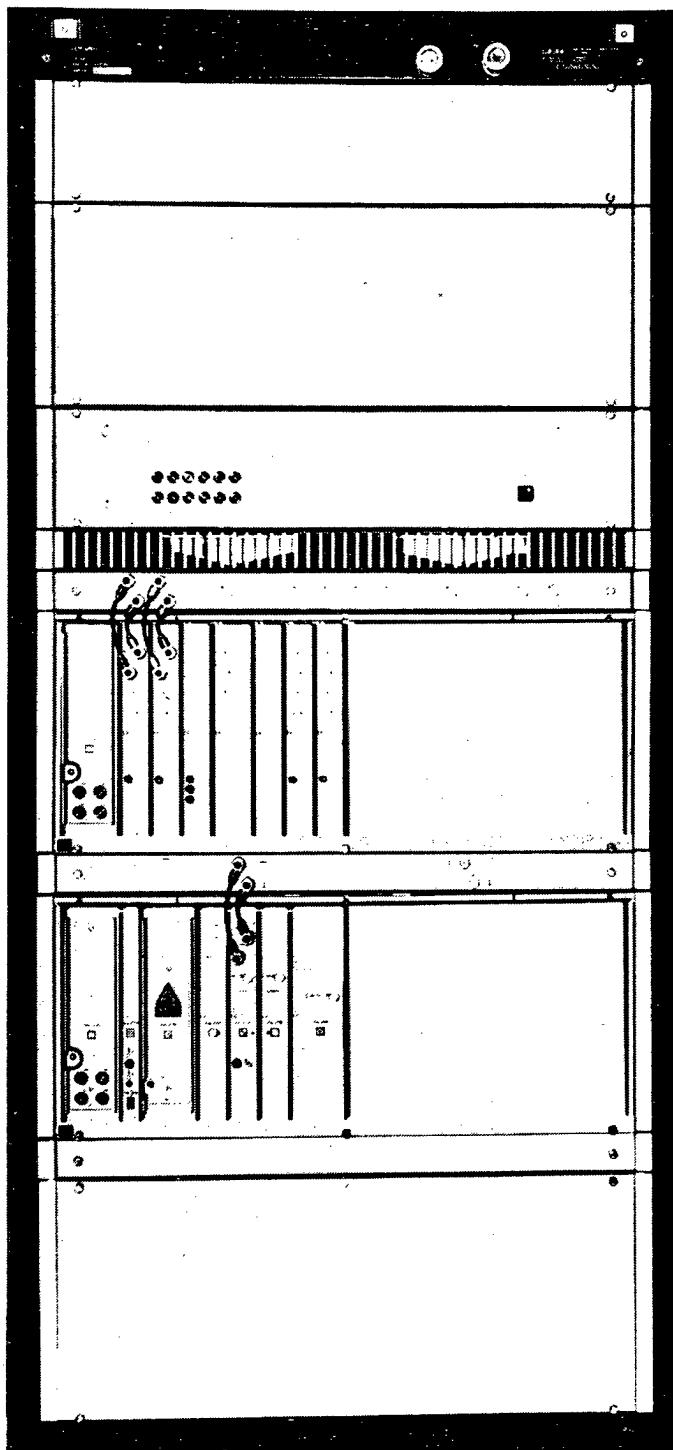
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(U) East German PCM-480 Fiber Optic System

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Comment--Mr. J. Thacker/FSTC, AIFREC/804-296-5171, X441, or AUTOVON 274-7441:

(C) The most significant aspect of the PCM-480 LLNS is its higher capacity. Previous Warsaw Pact fiber-optic communication equipment had a maximum of 120 channels. The second major characteristic worth noting is the system's fairly long repeater spacing of 10 km, as compared to the 3-km spacing on Soviet-built IKM-480 copper-cable system. The wider repeater spacing is made possible by the use of the GaAlAs laser and the APD, which give the PCM-480 LLNS a wide system margin. The increased capacity and longer repeater spacing of this fiber system make it technically and economically competitive with existing Warsaw Pact transmission systems.

(C) Other advantages of this system are its light weight (17 kg), low power consumption (65 W), and wide operating temperature range (5° to 45°C). All of these factors, in addition to the inherent advantages of fiber-optic systems, make the PCM-480 LLNS applicable to military communications. (DECL OADR)

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